Claims:

1. (Currently amended) A multi-functional device for producing mechanical vibrations in response to an electrical signal, comprising

a piezoelectric component having two opposing surfaces, said piezoelectric component further having at least two points where polarity is recognized.

2. (Currently amended) The device according to claim 1, wherein the piezoelectric component comprises a unimorph piezoelectric structure having piezoelectric material bonded between two metallic support layers.

3. (Currently amended) The device according to claim 1, wherein the piezoelectric component comprises a bimorph piezoelectric structure having piezoelectric material bonded to two different surfaces of a metallic support layer.

4. (Currently amended) The device according to claim 1 wherein at least one acoustic member is attached to one of the surfaces of the piezoelectric component.

5. (Currently amended) The device according to claim 1 wherein the piezoelectric component has a T-shaped planform that comprises a neck region extending from one side of the piezoelectric component.

6. (Currently amended) The device according to claim 5 further comprising a clamp, connected at the neck region of the piezoelectric component, for coupling the piezoelectric component to a base in a cantilever fashion.

7. (New) The device according to claim 1 further comprising a clamp, connected at one end of the piezoelectric component, for coupling the piezoelectric component to a base.

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8. (Currently amended) The device according to claim 1 further comprising means, positioned at one end of the piezoelectric component, for adjustably connecting the piezoelectric component to a base surface.

9. (Currently amended) The device according to claim 1 wherein at least one acoustic member comprises a surrounding wall portion having a bottom surface and a top surface, the surrounding wall portion extending along a direction substantially perpendicular from the bottom surface to the top surface, the bottom surface being operatively connected to the piezoelectric component.

10. (Currently amended) The device according to claim 9 wherein at least one acoustic member further comprises an end portion, operatively connected to the top surface of the surrounding wall portion, to form an enclosed chamber within the acoustic member when the bottom surface of the acoustic member is connected to the piezoelectric component.

11. (Currently amended) The device according to claim 10 wherein the end portion has an orifice to form a passageway through the end portion to the chamber.

12. (Currently amended) The device according to claim 1 wherein the mechanical vibrations are of sufficient force to produce audible sound over substantially the entire audible frequency range.

13. (Currently amended) The device according to claim 1 wherein the mechanical vibrations are of sufficient force as to be readily felt by a holder of the device.

14. (Currently amended) The device according to claim 1 wherein the mechanical vibrations are of sufficient force as to produce an audible alerting signal, a tactile alerting signal, and audible sound over substantially the entire audible frequency range.

15. (Currently amended) The device according to claim 1, wherein the point of attachment of at least one acoustic member is approximately at an anti-node of the piezoelectric component.

16. (Currently amended) The device according to claim 1, wherein a dampening material of low elastic modulus substantially covers at least one surface of the piezoelectric component.

17. (New) A device for producing mechanical vibrations in response to an electrical signal, comprising

a piezoelectric component having two opposing surfaces, said piezoelectric component further having at least two points where polarity is recognized; and

wherein the piezoelectric component has a T-shaped planform that comprises a neck region extending from one side of the piezoelectric component.

18. (New) A device for producing mechanical vibrations in response to an electrical signal, comprising

a piezoelectric component having two opposing surfaces, said piezoelectric component further having at least two points where polarity is recognized; and

wherein a dampening material of low elastic modulus substantially covers at least one surface of the piezoelectric component.

19. (Original) An article for producing sound comprising:

a surrounding wall portion having a bottom surface and a top surface, the surrounding wall portion extending along a direction substantially perpendicular from the bottom surface to the top surface, the surrounding wall portion having a thickness; and

an end portion, operatively connected to the top surface of the surrounding wall portion to define a surrounded area within the article, the end portion having a thickness, the end portion having an orifice to form a passageway through the end portion to the surrounded area.

20. (New) An article for producing sound according to claim 19 wherein bottom surface is operatively coupled to a vibrating surface thus producing a Helmholtz-like chamber.

21. (New) An article for producing sound according to claim 19 wherein a means for securing bottom surface to vibrating surface does not mechanically constrain vibrating surface.

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Claims:

1. A device for producing mechanical vibrations in response to an electrical signal, comprising

a piezoelectric component having two opposing surfaces, said piezoelectric component further having at least two points where polarity is recognized; and wherein a dampening material of low elastic modulus substantially covers at least one surface of the piezoelectric component.

2. The device according to claim 1, wherein the piezoelectric component comprises a unimorph piezoelectric structure having one piezoceramic wafer bonded between two metallic support layers.

3. The device according to claim 1, wherein the piezoelectric component comprises a bimorph piezoelectric structure having two piezoceramic wafers, each piezoceramic wafer being bonded to a different surface of a metallic support layer.

4. The device according to claim 1 wherein at least one acoustic member is attached to one of the surfaces of the piezoelectric component.

5. The device according to claim 1 wherein the piezoelectric component has a T-shaped planform that comprises a neck region extending from one side of the piezoelectric component.

6. The device according to claim 5 further comprising a clamp, connected at the neck region of the piezoelectric component, for coupling the piezoelectric component to a base.

7. The device according to claim 1 wherein the piezoelectric component is coupled to a base in a cantilever fashion.

8. The device according to claim 1 further comprising means, positioned at one end of the piezoelectric component, for adjustably connecting the piezoelectric component to a base surface.

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9. The device according to claim 4 wherein at least one acoustic member comprises a surrounding wall portion having a bottom surface and a top surface, the surrounding wall portion extending along a direction substantially perpendicular from the bottom surface to the top surface, the bottom surface being operatively connected to the piezoelectric component.

10. The device according to claim 4 wherein at least one acoustic member further comprises an end portion, operatively connected to the top surface of the surrounding wall portion, to form an enclosed chamber within the acoustic member when the bottom surface of the acoustic member is connected to the piezoelectric component.

11. The device according to claim 4 wherein the end portion has an orifice to form a passageway through the end portion to the chamber.

12. The device according to claim 1 wherein the mechanical vibrations are of sufficient force to produce audible sound over substantially the entire audible frequency range.

13. The device according to claim 1 wherein the mechanical vibrations are of sufficient force as to be readily felt by a holder of the device.

14. The device according to claim 1 wherein the mechanical vibrations are of sufficient force as to produce an audible alerting signal, a tactile alerting signal, and audible sound over substantially the entire audible frequency range.

15. The device according to claim 1, wherein the point of attachment of at least one acoustic member is approximately at an anti-node of the piezoelectric component.

16. A device for producing mechanical vibrations in response to an electrical signal, comprising

a piezoelectric component having two opposing surfaces, said piezoelectric component further having at least two points where polarity is recognized; and

wherein the piezoelectric component has a T-shaped planform that comprises a neck region extending from one side of the piezoelectric component.

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17. A device for producing mechanical vibrations in response to an electrical signal, comprising

a piezoelectric component having two opposing surfaces, said piezoelectric component further having at least two points where polarity is recognized; and wherein a dampening material of low elastic modulus substantially covers at least one surface of the piezoelectric component.

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